

REMARKS

I. Introduction

In response to the Office Action dated February 16, 2011, Applicants have incorporated the limitations of claim 3 into independent claim 1. Claim 3 has been cancelled, without prejudice. Applicants have taken care to avoid the introduction of new matter.

Applicants appreciate the granting of an interview with the Examiner on April 25, 2011 to discuss the § 103 rejections of the claims over the cited prior art. During the interview, Applicants argued that the combination of Suzuki and Daroux is improper, and as such, the § 103 rejection of the claims should be withdrawn. No agreement was reached.

For the reasons set forth below, Applicants respectfully submit that all pending claims are patentable over the cited prior art references.

II. The Rejection Of Claims 1-3, 8-13, 17 And 18 Under 35 U.S.C. § 103

Claims 1, 3, 8-10, 13, 17 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Suzuki et al. (US 2002/0037450) in view of Delnick (USP No. 5,948,464), Daroux et al. (USP No. 6,562,511), and Kizu (US 2003/0165739); claim 2 as being unpatentable over Suzuki, Delnick, Daroux and Kizu as evidenced by the melting point of acrylonitrile retrieved from <http://scientificpolymer.com/catalog/description.sap?QProductCode=134> on 3/27/2010; claim 11 as being unpatentable over Suzuki in view of Delnick, Daroux and Kizu and further in view of Ota et al. (USP No. 6,365,300); and claim 12 as being unpatentable over Suzuki in view of Delnick, Daroux and Kizu and further in view of Hampden-Smith et al. (US 2002/0168570). Applicants respectfully submit that Suzuki, Delnick, Daroux, Kizu,

scientific polymer, Ota, and Hampden-Smith fail to render the pending claims obvious for at least the following reasons.

With regard to the present disclosure, amended independent claim 1 recites, in part, a lithium ion secondary battery comprising a positive electrode for absorbing and desorbing lithium ion, a negative electrode for absorbing and desorbing lithium ion, and a porous film interposed between the positive electrode and the negative electrode. The porous film has a thickness of 0.5 to 20 μm and comprises an inorganic filler and a first binder. A content of the first binder in the porous film is 1.5 to 8 parts by weight per 100 parts by weight of the filler. The first binder comprises core-shell type particles of acrylonitrile-acrylate copolymer having a polyacrylonitrile chain as a first rubber, the first rubber being water-insoluble and having a decomposition temperature of 250°C or higher.

Features of the present disclosure are that the first binder comprises core-shell type particles of acrylonitrile-acrylate copolymer having a polyacrylonitrile chain as a first rubber.

Because of the polyacrylonitrile chain, the first rubber exhibits excellent heat resistance and high decomposition start temperature. As such, even when a short-circuit caused by a nail penetration test generates heat, the deformation and melting of the porous film due to the heat can be suppressed.

It is admitted that Suzuki and Delnick fail to teach or suggest a first binder that comprises core-shell type particles of acrylonitrile-acrylate copolymer. Rather, Suzuki teaches the use of core-shell type particles in the negative electrode. Delnick discloses a binder. However, the Examiner asserts that it would have been obvious to utilize the core-shell particles of the negative electrode of Suzuki in the binder of Delnick. Applicants respectfully disagree.

Foremost, Suzuki and Delnick fail to disclose a porous film using core shell type particles as a binder. Suzuki discloses a negative electrode using core-shell type particles. There is no rationale for one skilled in the art to substitute the material of the negative electrode of Suzuki in the binder of Delnick. Delnick teaches a separator having an inorganic filler and binder, thus, the skilled artisan would use the inorganic filler and binder of Delnick, not the negative electrode of Suzuki. It is only by improper hindsight reasoning that the Examiner uses a negative electrode material in the binder of Delnick.

Moreover, even if one were to use the porous film of Delnick with the battery of Suzuki according to the teachings of Daroux of using the separator of a plurality of layers, the porous film using core-shell type particles as the binder still would not be achieved. As such, it is clear that the combination of Suzuki with Delnick or Daroux is based solely on improper hindsight reasoning. Moreover, Kizu, Ota, scientificpolymer, and Hampden-Smith do not, and are not relied upon to remedy this deficiency. As such, Applicants respectfully request that the § 103 rejection of claim 1 be withdrawn.

In addition, the Office Action states that Daroux teaches a separator thickness of about 15 to about 35 μm . As such, the minimum thickness of the separator in Daroux, due to two layers, is 30 μm . Accordingly, Daroux fails to render the claimed range of thickness of the separator of claim 1 of 15 to 30 μm , obvious.

Therefore, as is well known, in order to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. As Suzuki, Delnick, Daroux, Kizu, scientificpolymer, Ota, and Hampden-Smith do not disclose lithium ion secondary battery comprising: a first binder which comprises core-shell type particles of acrylonitrile-acrylate copolymer having a polyacrylonitrile chain as a first rubber, it is apparent

that Suzuki, Delnick, Daroux, Kizu, scientificpolymer, Ota, and Hampden-Smith fail to render amended claim 1 or any dependent claims thereon obvious. Accordingly, the Applicants respectfully request that the § 103 rejection be withdrawn.

III. All Dependent Claims Are Allowable Because The Independent Claim From Which They Depend Is Allowable

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as amended claim 1 is patentable for the reasons set forth above, it is respectfully submitted that all pending dependent claims are also in condition for allowance.

IV. Conclusion

Having responded to all open issues set forth in the Office Action, it is respectfully submitted that all claims are in condition for allowance.

Application No.: 10/568,536

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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